

PATENT

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FIG. 6A is a block diagram of a multi-processor server computer 600 in which the disclosed warranty upgrade technology is employed. Computer 600 includes processor memory modules (PMM's) 605 respectively coupled to I/O modules (IOM's) 610. Power supplies 615 are coupled to both PMM's 605 and IOM's 610 to provide power thereto. FIG. 6B is a block diagram which shows PMM 605 in more detail. PMM 605 includes a CPU 615 coupled to an Intel Northbridge chip 620 as shown. One or more memory modules 625 are coupled to the Northbridge 620 so that memory to facilitate execution of computer programs is provided to CPU 605. FIG. 6C is a block diagram which shows IOM 610 in more detail. IOM 610 includes an Intel Southbridge chip to which SM bus 630 is coupled as shown. A secure processor 640, for example of the TCPA type discussed earlier is coupled to SM bus 640. Secure processor 640 validates and stores warranty configuration information in a secure memory (not shown in this view) as discussed earlier.

FIG. 7A is block diagram of a blade server which includes multiple blade computers (blades) 705. Each blade is essentially a computer on a card. Blades 705 are all coupled to a common network interface 720. In this manner network interface 720 acts as a network concentrator to avoid a mass of I/O and power cables extending from each blade. Network interface 720 is coupled to embedded server management (ESM) module 725 which detects the installation and removal of the other modules within the chassis, and monitors the environmental characteristics (such as thermal) of the chassis.

In one embodiment, ESM 725 includes a secure processor 735 which performs substantially the same secure processor functions described earlier, for example, securely storing validated warranty configuration information. Secure processor (SP) 735 stores information describing the configuration of blade server 700 in a memory coupled thereto (not shown). In another embodiment, each blade 705 includes its own secure processor 765 such as shown in FIG. 7B. In more detail, blade 705 includes one or more CPU's 740 coupled to an Intel Northbridge chip 745. Northbridge chip 750 is coupled to memory 750 and to Southbridge chip 755 as shown. Southbridge chip 755 is coupled to SM bus 760. Secure processor 765 is coupled to SM bus 760 to provide blade 705 with secure storage of validated

warranty configuration information in a manner whereby it cannot be compromised by the user.

Blade computers 705 are essentially self-contained computer modules each of which has a respective serial number associated therewith. These serial numbers are stored by secure processor 735 as part of the configuration information for blade server 700. Component type information is also stored by secure processor 735 with the respective component serial numbers together with the other configuration information discussed earlier. When server 700 is assembled, it is possible that some of blade computers 705 are new and some are used. Thus, some blade computers will have different warranty periods than others. When the warranty for computer 700 is registered or upgraded, the configuration information stored by secure processor 735 will include the respective warranty periods for the individual blade computers 705. Individual modules can have more than one serial number or identification number. In that case, one or both numbers are stored in the configuration information along with the respective part type and warranty period.

As can be seen, a principal advantage of these embodiments is the provision of a warranty methodology wherein the upgrade warranty cost and price for a configurable electrical device are determined based on the particular upgraded configuration of the computer to be warranted. Advantageously, this methodology reduces warranty fraud. While this novel methodology has been described with reference to a computer system which is one example of a configurable electrical device, the disclosed methodology also applies to other configurable/upgradeable electrical devices such as personal digital assistants (PDA's), cellular and other telephone devices, satellite receivers, home entertainment systems, electronic gaming equipment, configurable automotive electronic devices, etc., and combinations thereof. Such devices have become so processor dependent that they are considered to be computer systems. While in the particular embodiments shown a configuration includes hardware information, it should be appreciated that

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software associated with an electrical device can also be upgraded and that such software also forms part of the overall configuration to be warranted.

5 Although illustrative embodiments have been shown and described, a wide range of modification, change and substitution is contemplated in the foregoing disclosure and in some instances, some features of the embodiment may be employed without a corresponding use of other features. Accordingly, it is appropriate that the appended claims be construed broadly and in a manner consistent with the scope of the embodiments disclosed herein.

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